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ABSTRACT

Thirty-eight rural kindergarten students participated in this quasi-experimental study designed to assess the effect of employing daily, sequential phonemic awareness exercises on kindergartners' developmental spelling skills. In September all students were assessed for letter recognition, symbol-sound correspondence, phoneme segmentation and blending skills, and developmental spelling level. The Peabody Picture Vocabulary Test (revised) for receptive language was administered to show equality between treatment and control groups. Both groups received the same instruction on alphabet recognition and sound-symbol correspondence. In late February, after 5 months of phonemic awareness training, the 20 students in the treatment group scored significantly higher on auditory three-phoneme blending and segmentation measures than the 18 children who did not receive the training. On an assessment of graphemic representation of three-phoneme words, the 14 non-ESL (English as a second language) students in the treatment group scored significantly higher than the 13 non-ESL students in the control group. An analysis of spelling in the journal writings in March showed that five students in the treatment group compared to one student in the control group were writing at the phonetic developmental spelling level (Gentry, 1982). The majority of children in both classes were writing at the semi-phonetic level. Students in the treatment group demonstrated a more consistent skill at rereading their writings than their counterparts in the control group. The results of this study suggest that phoneme segmentation skill increases student ability to represent more phonemes in words they attempt to write. Contains 23 references and 11 figures. Appendixes contain evaluation instruments and various learning tasks. (Author/RS)

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Running head: DEVELOPMENTAL SPELLING AND PHONEMIC AWARENESS

Developmental Spelling and Phonemic Awareness in Kindergarten

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Abstract

Thirty-eight rural kindergarten students participated in this quasi-experimental study designed to assess the effect of employing daily, sequential phonemic awareness exercises on kindergartners' developmental spelling skills. In September all students were assessed for letter recognition, symbol-sound correspondence, phoneme segmentation and blending skills, and developmental spelling level. The Peabody Picture Vocabulary Test (revised) for receptive language was administered to show equality between treatment and control groups. Both groups received the same instruction on alphabet recognition and sound-symbol correspondence. In late February, after five months of phonemic awareness training, the 20 students in the treatment group scored significantly (p <.001) higher on auditory three-phoneme blending and segmentation measures than the 18 children who did not receive the training. On an assessment of graphemic representation of three-phoneme words, the 14 non ESL students in the treatment group scored significantly ($p < .01$) higher than the 13 non ESL students in the control group. An analysis of spelling in the journal writings in March showed that 5 students in the treatment group compared to one student in the control group were writing at the phonetic developmental spelling level (Gentry, 1982). The majority of children in both classes were writing at the semi-phonetic level. Students in the treatment group demonstrated a more consistent skill at rereading their writings than their counterparts in the control group. The results of this study suggest that phoneme segmentation skill increases student ability to represent more phonemes in words they attempt to write.

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Introduction

One of the most important curriculum decisions facing early childhood educators is how to teach children alphabet letters as well as imparting an understanding of how English orthography works. If children are simply taught letter names, they are gaining little useful information in terms of sound-symbol correspondence. Letter name knowledge is of little use when attempting to encode or decode. Thus it is important to determine, using evidence from research, how to teach children alphabet symbols as well as the phonemes those symbols represent. Choosing an effective and efficient method is imperative due to the time constraints and the increased academic demands once kindergartners reach first grade.

A great deal of research has been conducted over the past 30 years to determine the effectiveness of teaching sound-symbol correspondence through invented spelling. This strategy emphasizes the importance of teaching children to use the letters they learn for authentic writing purposes. Chomsky (1971) recognized that children have great phonetic acuity and ability in terms of analyzing words into their component parts. Several case studies have traced children's emerging understanding of English orthography through their use of invented spelling (Bissex, 1980; Calkins, 1994; Chapman, 1996; Sorenson & Kerstetter, 1979). Researchers have also found correlations between invented spelling ability in kindergarten and reading ability in first and second grade (Richgels, 1995; Robinson, 1990, 1991). Graves (1983) suggests that children can begin to compose when they know as few as six consonants.

Rather than immersing children in worksheets that isolate letters, invented spelling enables children to use letters to create their own understanding of how sounds work together to make words. As children write, they gain practice in segmenting phonemes as well as reinforcement in linking phonemes to graphemes. Researchers

have determined that understanding of sound-symbol correspondence and phonemic segmentation are essential components of a literacy program that encourages invented spelling (Ball & Blachman, 1991). With a wealth of research stressing the importance of phoneme awareness and the reciprocal relationship of invented spelling, kindergarten teachers might ensure that their curricula address these essential components of a strong literacy foundation. Spelling should be recognized as a developmental process consisting of sequential stages. Kindergartners should be provided with daily opportunities that facilitate their individual progress through these stages.

Purpose of Study

The intent of this quasi-experimental study was to assess the effect of employing daily, sequential phonemic awareness activities on kindergartners' developing invented spelling ability. This study compared the invented spelling ability of kindergartners receiving daily, sequential phonemic awareness training with kindergartners that were not receiving the training. A sequential phonemic awareness curriculum (Adams, Beeler, Foorman & Lundberg, 1998) was employed as the independent variable. Invented spelling ability was the dependent variable.

Research Questions and Hypothesis

The intent of this study was to determine whether additional phonemic awareness instruction strengthens an existing literacy program. Writing is a cornerstone of my early literacy practice and the following research questions address emergent writing ability.

My grand tour question asks:

- Will exposure to daily, sequential phonemic awareness activities, beginning in

September, improve kindergartners' invented spelling ability when measured in February?

My sub questions query:

- Will kindergartners with less emergent writing skill benefit to a greater or lesser degree from phonemic awareness exercises than kindergartners who enter with a stronger literacy background?
- Will kindergartners trained in phonemic awareness progress more rapidly through the developmental spelling stages?
- Can all kindergartners be trained in phoneme segmentation?
- Do kindergartners who are exposed to daily phonemic awareness instruction show more motivation to take part in invented spelling than children in the control group?
- Can children be phonemically aware without being graphemically aware?

I hypothesize that kindergartners who receive additional phonemic awareness instruction will produce longer written passages with more phonemes represented per word than kindergartners who do not receive this treatment. The dependent variable, invented spelling ability, will be measured by phonemes represented per word in two researcher designed writing tasks of three and four phoneme words. The independent variable will be an additional 20 minutes of phonemic awareness instruction (Adams et al., 1998) each day for the treatment group. Both treatment and control groups will receive daily instruction in sound-symbol correspondence. The instructor will be the same for each group.

Theoretical Perspective

Invented spelling enables children to construct a working knowledge of English orthography. The constructivist model of learning posits that, "...Children acquire

knowledge not by internalizing it directly from the outside but by *constructing* it from the inside, in interaction with the environment" (Kamii, Manning & Manning, 1991, p.18).

In terms of language acquisition, both oral and written, constructivists believe that children explore with the parts to construct their own understanding of how the whole works. Gentry (1982) and Graves (1983) have developed systems for analyzing children's phonemic knowledge and understanding of spelling patterns as measured by their invented spellings. The developmental spelling theory suggests that writing with whatever phonemic knowledge they possess helps children develop an understanding of how written language works. I expect my independent variable, the introduction of a daily sequential phonemic awareness curriculum (Adams et al., 1998), to enhance invented spelling ability. As children are exposed to and encouraged to play with units of sound, their awareness of how those sounds work together to create words should increase.

Definition of Terms

The following terms are used frequently throughout this study and it is important that their meaning be both consistent and precise.

grapheme - a written representation of a phoneme (Harris & Hodges, 1995, p. 101).

invented spelling - spelling words according to the writer's knowledge of the spelling system (Harris & Hodges, 1995, p.123).

orthography - the representation of the sounds of a written language by printed symbols.

phoneme - a minimal sound unit of speech that affects the meaning of a word (Harris & Hodges, 1995, p.183).

phoneme segmentation - segmenting a word into its component phonemes (Harris &

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Hodges, 1995, p.185) .

phonemic awareness - an awareness that words are made up of sounds and that letters represent units of sound (Harris & Hodges, 1995, p.185).

phonemic awareness training - taking part in sequential phoneme awareness activities.

sound-symbol correspondence - the relationship between a phoneme and the grapheme that represents it (Harris & Hodges, 1995, p. 183).

This study also attempts to measure graphemic awareness which indicates not merely an awareness that words consist of phonemes but that those phonemes can be represented with corresponding graphemes. Invented spelling ability is measured by how nearly a student is able to represent graphemically the phonemes they hear within each word.

Delimitations and Limitations of the Study

This study examined the benefits of encouraging children to write using invented spelling. It did not address research that examines at which point in a child's spelling development teachers should begin to emphasize conventional spelling nor did it address the large body of research that discusses the benefits of family literacy learning on emergent writing.

Limitations in this study included the small sample size of two classes, (due to treatment being assigned to an existing group) and the resultant limited generalizability. Another limitation was the time frame, which allowed roughly five months of treatment and data collection beginning at the first of the year. Many of the kindergartners in the rural community in which the study took place arrived in September with little to no alphabet knowledge. The dependent variable, invented spelling, requires some understanding of sound-symbol correspondence. Emergence

into invented spelling can be very slow in the early months, so more significant results might occur if data collection ended in May.

Another limitation in this study was that the researcher was also the teacher of both classes. This study was based on comparing the differences between a class that experienced an additional phonemic awareness curriculum and a class that did not. It was essential that the researcher not use activities with the control group that were being used with the treatment group as part of the additional curriculum. These additional elements included books, songs, movement games and numerous letter and sound activities that could not be introduced to the control group until the treatment ended in late February and data collection was complete.

Significance of the Study

In light of the research indicating the developmental nature of spelling (Bissex, 1980; Gentry, 1982; Graves 1983), kindergarten teachers should strive to offer a holistic curriculum that strengthens children's invented spelling ability. By providing a strong writing foundation, children's emergent reading ability is also enhanced. All educators of young children should be keenly interested in whether an investment of 20 minutes of instructional time per day can result in a significant difference in their students' literacy levels. This study will also further the body of research on whether encouraging invented spelling helps less emergent kindergartners gain the literacy skills they need.

Review of the Literature

The literature selected for this study includes research that illustrates the positive effects of encouraging invented spelling, such as increased writing fluency and confidence. It also focuses on studies that examine positive correlations between

invented spelling ability and later reading ability. Other articles in the review discuss the importance of phonemic awareness and phoneme segmentation on invented spelling ability.

Researchers have been studying the importance of invented spelling for years. Gentry (1982) suggested that developmental spelling consisted of five steps, three of which strongly feature invented spelling. Other researchers have designed studies to determine how invented spelling influences students' ability to read words as well as how it affects the length and complexity of their writing. As invented spelling gains acceptance as an effective practice, researchers question whether all children, not just those from literacy rich backgrounds, will be able to construct their own understanding of written language through being encouraged to use invented spelling.

Stages of Developmental Spelling

To understand spelling development, it is important to first look at the stages discovered by several researchers in the mid to late 1970s as they analyzed young children's early writings. Gentry describes these five stages as he examines Bissex's (1980) case study, GNYS AT WRK. The precommunicative stage involves children using symbols from the alphabet to represent words but demonstrating no knowledge of sound-symbol correspondence. In the semi-phonetic stage children use letter names as well as sounds to represent words. During the phonetic stage children represent all the phonemes of the word being spelled through their understanding of letter-sound correspondence. In the transitional stage, writers begin to use many conventional spellings and conventional alternatives for representing sounds. Transitional spellers are aware of how words should look. Spelling has become a more visual and less auditory activity. The last stage is the correct spelling stage where children have knowledge of a great body of correct word spellings. Gentry

contends that development in spelling is continuous and that once children have reached a certain stage, they will not return to a previous stage.

Ehri (1992) proposed a four-stage model of spelling development that uses components of other developmental models and reflects correspondences between written units and spoken units in children's invented spellings (p. 312). In the precommunicative/prephonetic stage, children produce strings of letters or scribbles to represent words. In the semi-phonetic stage, children use letter names and sounds to create words, beginning with the first and last letters they hear. In the phonetic stage children are able to segment words into sounds and represent each sound with a letter. In the morphemic stage, children begin to use spelling conventions such as the -ed ending in barked as opposed to barkt.

Graves (1983) breaks down the developmental process of invented spelling into the following five general stages:

Stage I -	Use of initial consonant	G	(grass)
Stage II -	Initial and final consonant	GS	(grass)
Stage III -	Initial, final, and interior consonant	GRS	(grass)
Stage IV -	Initial, final, and interior consonants, and vowel place holder. Vowel is incorrect but in correct position.	GRES	(grass)
Stage V -	Child has the full spelling of the word, with final components from visual memory systems and better vowel discrimination (p. 185).	GRASS	

These stages show the child's increasing ability to segment phonemes and represent them symbolically. Initial consonants are generally the first phonemes children are able to isolate, followed by final consonants and interior vowel sounds.

Consonant clusters require a finer phonemic segmentation ability and are usually represented by one component phoneme by beginning writers. Graves' taxonomy represents this natural progression.

Invented Spelling and Word Recognition

In correlational studies, invented spelling performance is found to predict reading achievement as much as a year later. Significant correlations between preschoolers' invented spelling ability and their performance on the Test of Early Reading Ability (1989), and between kindergartners' invented spelling and their ability to read storybooks, as well as their own compositions, have been established (Clarke, 1988; Richgels, 1986). Long term, classroom correlational studies have consistently shown a strong relationship between invented spelling and word reading.

Richgels (1995) conducted a causal-comparative study to determine if non-word reading kindergartners identified as good inventive spellers would have an easier time learning words than children identified as poor inventive spellers.

Kindergarten students from five Chicago area schools were screened to form two groups, one made up of 16 poor inventive spellers and the other made up of 16 good inventive spellers. The students all came from classes that endorsed a whole language philosophy with phonics instruction embedded in literature experience. The children worked one-on-one with an experimenter and learned six easy phonetically simplified three-letter words including *PNO* for *piano* and *TEM* for *team*. The students also learned six more difficult phonetically simplified seven and eight-letter words including *TELEFON* for *telephone* and *NUTKRAKR* for *nutcracker*. The subjects took part in two sessions of test trials where they read through the word cards and their responses were recorded as either correct or incorrect.

The results of these trials indicated that good inventive spellers are better word

learners than poor inventive spellers. The findings also indicate a correlation between inventive spelling and reading achievement. Richgels (1995) concluded that, "Inventive spellers are especially prepared for the use of phonetic knowledge that beginning word reading requires" (p.108). In Richgels' (1986) correlational study working with preschoolers and kindergartners and the strategies they employ to write words, he concluded that invented spelling ability was related to both children's ability to read conventional and non-conventional spellings. He also noted that assessment of children's invented spellings were a valuable way to determine their knowledge of written language.

Effects Of Invented Spelling On Writing Development

Research indicates that phonemic awareness, the ability to break words into their smallest sound units and to match those units with print symbols, is one of the most important steps in becoming a reader and writer (Ball & Blackman, 1991; Tangel & Blackman, 1992, 1995; Treiman, 1992). Some studies have suggested that children can acquire this understanding of phonemes naturally through interacting with print (Richgels, Poremba & McGee, 1996). Research also indicates that an effective phonics strategy includes teaching phonics throughout the day in the context of authentic situations and not as a separate subject. Though many researchers agree that children from homes providing literacy rich experiences can acquire phonemic awareness without direct instruction (Bissex, 1980; Calkins, 1994; Sorenson & Kerstetter, 1979), a debate lies in whether children who are not from literacy rich environments and have little alphabet knowledge can also acquire phonemic awareness naturally.

In a 1996 case study, Chapman charted the progress of a first-grader with little alphabet knowledge or interest in writing throughout the course of a year in a whole

language classroom where children were encouraged to use invented spelling in their writer's workshop and were immersed in meaningful print. The subject of Chapman's case study was a low-readiness first grader named Brandon. Upon entering first grade, Brandon did not know the letters of the alphabet and the only word he could print was his name. Brandon's first grade teacher taught reading and writing simultaneously. Children were encouraged to write, using their own ideas about print, from the beginning of the year. Literacy activities included shared reading using charts and big books, collaborative writing, writing workshop, author's circle and story time. All of Brandon's writings from the daily writing workshop were collected throughout the year and were analyzed to chart his growth in writing.

Nine of Brandon's independently produced writing samples were chosen to chart his skill development from September to May. These writings were analyzed for use of consonant sounds, long vowel sounds, short vowel sounds, digraphs, number of phonemes represented per word and number of clauses. Brandon's phonemic awareness as evidenced in his writings grew steadily and by March he represented almost all of the phonemes in his words as well as using several conventional spellings. Though he had entered first grade at a lower level of phonemic awareness than his classmates, by mid-year his development was comparable. Chapman concludes that Brandon acquired his understanding of written language, including phonemic awareness and sound-symbol correspondence by being immersed in language-centered, developmentally appropriate literacy experiences.

This case study emphasizes again how important it is for children to be able to freely explore sound-symbol correspondences to allow them to construct their own understanding of how written language works. Though language immersion seems to have worked in Brandon's case, direct instruction in phonemic awareness might also have been beneficial. It is difficult to generalize from a study of one child.

Effects Of Invented Spelling on Student Confidence and Writing Fluency

Brandon's story of learning to write by creating his own spelling before learning to read is part of a growing body of literature dealing with spelling development and the relationship between writing and reading. How important is invented spelling in the developmental writing process? Clarke (1998) conducted a study to test the claims of proponents of invented spelling by comparing the progress of children encouraged to use traditional spelling in creative writing with children encouraged to use invented spellings. Clarke focused on three questions comparing writing, spelling and reading achievement:

> First, how would children's writing processes differ in the classroom? Second, how would children's written productions differ as to length and complexity, level of word usage, percent of words misspelled, and the pattern of spelling errors? Third, how would children's spelling and reading achievements differ by the second half of grade one? (p. 282)

Four first grade classrooms with a total of 102 middle-class students participated in the study. Two of the classrooms emphasized traditional spelling in their creative writing programs, while the other two encouraged invented spelling. All students participated in 80 to 100 minutes of writing per week. The four teachers used a basal reading program and taught letter sounds, generally in isolation. Students were pretested in October on tasks including letter naming and printing, and recognition of high-frequency words to ensure equivalency between classes.

Researchers systematically coded children's writing behaviors over six months including: child-centered behaviors when they were not writing, teacher-centered behaviors such as listening or waiting for the teacher, and non-aided as opposed to aided writing behaviors.

Once each month, writing samples were analyzed in terms of length, complexity,

spelling strategy, writing speed and level of word usage. The final writing sample for each class was on the same topic with specific instructions for students and a twenty minute time limit.

In March, children were posttested in groups of four or five for spelling and one-on-one for reading. Standardized spelling tests included a list containing one-half high-frequency, irregularly spelled words and one-half lower-frequency, regularly spelled words. Standardized reading tests included word recognition, word attack and reading comprehension skills.

An analysis of over 2500 codings on student writing behaviors indicated that students using traditional spelling spent 6 percent of their time writing from recall while children using invented spelling wrote from recall over 30 percent of the time. Waiting for help from teacher took 18 percent of traditional spellers' time and 1.2 percent of inventive spellers' time. Traditional spellers used writing aids such as dictionaries 25 percent of the time, while inventive spellers used aids 4 percent of the time. In addition, inventive spellers spent considerably more time rereading their writing than did traditional spellers.

An analysis of writing samples showed that works by inventive spellers were significantly longer, contained a greater word variety and a much higher percentage of incorrect spellings. Inventive spellers also wrote with greater speed than their traditional spelling counterparts. Inventive spellers showed greater skill in spelling and in word analysis tasks in reading, and low achieving inventive spellers scored higher on four (out of six) reading tasks than did low achieving traditional spellers. These results suggest that encouraging emergent writers to use invented spelling has a positive effect on student independence, confidence and writing fluency.

The Role Of Phonemic Awareness

A great deal of evidence indicates that phonological awareness correlates with early reading and spelling success. Researchers who have conducted studies in the effectiveness of teaching phonological awareness have found positive effects on both early and later reading and spelling performance (Ehri & Wilce, 1987; Robinson 1990, 1991).

Current methods of spelling development suggest that spellers in the semi-phonetic stage rely heavily on letter names to represent sounds. Treiman (1993) conducted a study to assess the effects of letter-name knowledge on invented spelling. Her naturalistic study involved a detailed analysis of 5,617 first grade spellings taken from students' independent writings. Spellings were analyzed to determine how frequently children used letter names to represent sounds and if some consonant names occurred more than others. Results indicated that the children did not use a consistent letter name spelling strategy. The letter names that were used most often to represent both a consonant and a vowel sound were r, l, m and n.

Following this study, Treiman (1993) conducted a series of experiments designed to answer the following questions:

1. Do letter name spellings occur when children are spelling single words in a controlled setting?
2. Do vowel consonant names (such as L) occur more often than consonant vowel names (such as T)?
3. How does children's use of consonant letter names in spelling change with age and schooling?
4. How does word length and syllable stress affect use of letter names?

Subjects included preschool through first-grade children who were pretested for letter name knowledge and were native speakers of English. Students were asked to

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spell control words (words not including letter names) and stimuli words (words including a letter name sequence) using magnetic letters. An ANOVA was run to determine significant patterns of spelling. R was the most common letter name used followed by L, then M, N, F and S. Younger children were more likely to use letter names than older school children. Children performed less well with the two syllable spellings than with the one syllable spellings.

Treiman concluded that children's reliance on letter names in early spelling is overstated. As children's ability to segment sounds increases, their use of letter names decreases.

Ball and Blachman (1991) conducted a study to determine whether instruction in sound-symbol correspondence alone, without an additional phonemic awareness component, would sufficiently increase kindergartners' phoneme segmentation skills and increase early reading and writing skills. Ball and Blachman (1991) focused on the following three questions concerning the interaction between sound-symbol correspondence and phonemic awareness: a) Can kindergartners be taught to segment words into phonemes? b) How does segmentation training affect early reading and spelling ability? c) How does training in sound-symbol correspondence affect segmentation skills and reading and spelling ability in kindergartners?

151 kindergartners from three schools in the Syracuse, New York Public School District were pretested in late January and early February using both the Peabody Picture Vocabulary Test-Revised (PPVT-R) and the word identification component of the Woodcock Reading Mastery Test. Kindergartners who scored 1.5 standard deviations below the mean on the PPVT-R were excluded from the study as were students who obtained raw scores greater than 3 on the Woodcock test. Thirty students from the remaining pool were randomly selected from each school to participate in the project.

Kindergartners were randomly assigned to one of three groups. Certified teachers involved in the study participated in four hours of training to conduct the intervention activities. The intervention began in the second week of March.

The phoneme awareness group took part in small group (5 students) phoneme segmentation activities and letter-name, letter-sound training 20 minutes per day, four days per week for a period of seven weeks. These activities included say-it-and-move-it activities, where students listened for sounds in a word and moved discs to represent each phoneme they heard. After the third week, letter tiles were introduced and children could use these to match phonemes heard. Students in this group also participated in DISTAR spell-by-sounds activities.

The language activities group also met in groups of five for 20 minutes, four days per week for seven weeks. They focused on vocabulary development, listened to stories and took part in semantic categorization tasks, as well as receiving letter-name, letter-sound training identical to the phoneme awareness group.

All groups participated in regular classroom instruction. The control group received no intervention.

At the end of seven weeks, the subjects were posttested on phoneme segmentation, letter names and sounds and the Woodcock Word Identification Subtest. Students were also asked to read 21 two and three-letter phonetically regular words and spell the following five words: lap, sick, pretty, train, and elephant. The spelling words were scored twice: once for correct spelling and once for developmental spelling level (a measure of invented spelling ability).

An ANOVA was conducted on the phoneme segmentation task to determine the effect of phoneme segmentation training. The phoneme awareness group performed significantly better than the other two groups ($p<.0001$). There were no significant differences between the control group and the language activities group on phoneme

segmentation ability.

An ANCOVA (with pretest as covariate) indicated that both the language activities group and the phoneme awareness group did significantly better on the letter-sound test ($p<.001$) than the control group, but showed little difference from each other.

The phoneme awareness group also scored significantly higher on reading the phonetically regular word list (a one-way ANOVA indicated significance at $p<.0001$) than both the control and language activities groups, which did not differ. The phoneme awareness group scored significantly higher on spelling items correctly ($p<.01$) and on invented spelling ($p<.001$) than the other two groups, which did not differ significantly from each other, though the language activities group did score higher than the control group.

These results clearly indicate that phoneme awareness instruction combined with letter-sound correspondence significantly improves kindergartners' early reading and spelling skills. Teaching letter-sound correspondence alone does not significantly improve children's segmentation skills in terms of reading and spelling. Exposure to a combination of phoneme awareness and letter-sound instruction helps children make the necessary connections between sound and print.

Tangel and Blachman (1992) conducted a study that questioned whether the invented spelling ability of kindergartners trained in phoneme awareness would differ from children who did not have the training. The subjects for their study were selected from 18 all-day kindergartens in four low-income, inner-city schools. The control group consisted of 72 children and the treatment group consisted of 77 children. The groups were comparable in the children's knowledge of letter sounds and names, phoneme segmentation ability and word recognition.

During the second half of the kindergarten year, the children in the treatment group participated in phoneme awareness training for 11 weeks. These activities consisted

of phoneme segmentation activities as well as letter name and sound activities. Children did not write letters or words as part of the treatment. The lessons were conducted by the classroom teacher or the teaching assistant in the kindergarten classroom four days per week for 15-20 minutes.

When the children were posttested in May, the children who had received the phoneme training scored better than the control group in alphabet recognition and sound knowledge, phoneme segmentation and beginning word recognition. A developmental spelling scale was developed to score the invented spelling of each group. The invented spellings of the treatment children were rated developmentally superior to those of the control children in terms of number and sequencing of phonemes represented.

This research indicates that for children who have had limited exposure to print and do not possess the phonological awareness necessary to create invented spellings, a combination of phoneme awareness and letter sound instruction will help them make the necessary connections between sound and print. The authors further suggest that, "Children who have repeated opportunities to invent spellings will enhance their phonemic awareness in the process" (Tangel & Blachman, 1992, p.255).

The current study attempted to determine whether the addition of a sequential phonemic awareness curriculum commencing in September would have a significant effect on rural, low income kindergartners' invented spelling ability when measured in February.

Method

Research Design

This quasi-experimental study assessed what effect an additional 20 minutes per day of sequential phonemic awareness training administered in the first six months of the school year would have on kindergartners' invented spelling ability. Subjects were assigned to one of four sessions of kindergarten on the basis of which school days their parents chose and what classroom environment parents selected for their child. Forty-two kindergartners (those assigned to the researcher's two sections) were pretested within the first month of school to assess their knowledge of letter recognition, sound-symbol correspondence and phoneme segmentation and blending ability. Students were also assessed with the PPVT-R to control for receptive language skill. The PPVT-R scores were used as a covariate to equate the two groups.

Following this preassessment, the treatment was randomly assigned to one class. Students were posttested at the end of February on letter recognition and sound correspondence as well as their ability to segment three and four letter phonetically regular words as evidenced by their attempts to spell these words from pictures. Their invented spellings were scored using Graves (1983) taxonomy of developmental spelling. Journal writings were also analyzed for overall developmental spelling level.

Subjects

The subjects of this study were five and six year old children from a predominantly low-income, rural population. Permission forms notifying parents of the research project were sent home to parents of prospective students before the school year started (see appendix A). In the treatment group, 70% of the students qualified for free

lunch and 14% qualified for reduced-price lunch. In the control group, 53% of the students qualified for free lunch and 11% qualified for reduced price lunch.

In the treatment group, six children spoke English as a second language (ESL) while 5 children in the control group spoke English as a second language. Of the ESL students in the treatment group, five spoke Russian as a native language and one child's first language was Spanish. In the control group, four of the ESL children spoke Russian as a first language and one child spoke Korean. Of the original 42 subjects, three from the control group moved out of the district and one from the treatment group was placed in preschool.

In the treatment group, nine of the 20 kindergartners attended preschool. In the control group, eight of the 18 students attended preschool. Of the eight children who attended preschool in the control group, six attended preschool in a School District special needs program. Four of these students were on behavioral I.E.P.s and two showed moderate learning delays. These six students were still on individualized education plans (I.E.P.s) this year and received five hours additional class time per week in a special needs kindergarten class. Because of the number of children on I.E.P.s, there was a full time instructional assistant in the control group paid for by special needs funds. The treatment group had no assistant and no children on I.E.P.s.

Children attended kindergarten on a six-hour, alternate day schedule. The control group attended kindergarten Monday, Thursday and every other Wednesday. The treatment group attended school Tuesday, Friday and every other Wednesday. School was in session from 9:25-3:25.

Instrumentation and Materials

Pretests

The PPVT-R was used as a covariate to statistically equate the two groups. Within

the first three weeks of school students participated in this receptive vocabulary assessment. The assessment was administered by either the classroom teacher or the special needs kindergarten teacher in a quiet area of the classroom away from distractions.

On two consecutive days at the end of September, a guest teacher facilitated classroom instruction enabling the kindergarten teacher to administer the alphabet recognition, symbol-sound correspondence and phoneme segmentation and blending tasks to both control and treatment groups. Children were taken individually to a small quiet room to participate in these assessments.

The alphabet recognition task used was part of the school district's kindergarten assessment package and consisted of having the student identify capital letters which were printed in 1 inch type on a grid with all 26 letters represented out of sequence (see appendix B). The teacher would point to a letter, beginning in the upper left hand corner and the child would be asked if they knew the letter name or sound. Students were instructed to say, "Pass," if they did not know either the letter name or sound. If a child named a letter they were then asked what sound it made. If they seemed unclear as to what the sound task entailed, they were reminded of the letter cards they were familiar with in the classroom that featured letters and an object that began with the letter sound. Naming the 26 letters, voicing the sound and last naming the object was an activity all students had participated in daily for the past month in kindergarten. The test was not timed. After completion of the capital letter assessment, students participated in a lowercase letter assessment that was conducted in the same way. Letters were scored as one point each, with vowels being scored as short sounds.

Following the alphabet assessment students participated in a phoneme blending task which was also part of the district kindergarten assessment (see appendix C). This task consisted of listening to discreet sounds in ten, three-phoneme words and

attempting to blend those sounds into the words they created. The teacher would first tell the student to listen to all the sounds and tell what word they heard. Students were given three examples which were not part of the scored assessment where the teacher voiced the sounds and gave the word they made. If students seemed baffled by the task after listening to the sounds in four test words, the teacher would return to the example words and start the assessment again. If the child still showed no understanding of what the task entailed, the blending assessment was considered complete. Each word correctly identified was worth one point for a point total of ten.

The final task in this pretest series, also a district assessment piece, was a phoneme segmentation assessment where the student was asked to divide the words they were given into their component sounds (see appendix D). The teacher gave three examples of words in the following fashion, "If I said cat, you would say c-a-t." If the child seemed puzzled after listening to the first four test words, the teacher would give the examples and start the assessment again. If the child showed no understanding after listening to the first four words a second time, the task was considered complete. Each word completely segmented or segmented into its onset and rime was worth one point for a point total of ten.

Posttests

At the end of February children were posttested on all tasks described in the preceding section. The assessment followed the same format with a guest teacher in the classroom and the children going individually with the kindergarten teacher to a quiet room away from distractions. The assessment tasks were identical and no time limit was imposed.

In mid-February each student participated in a graphemic representation of phonemes test. This was a researcher designed test modeled after two assessments included in Adams' phonemic awareness curriculum (Adams et al, 1998). This

assessment took place in a quiet corner of the classroom, one-on-one with the kindergarten teacher. The first task consisted of asking the child to spell 5 phonetically correct, one syllable, consonant-vowel-consonant (CVC) words representing each of the five short vowel sounds (see appendix E). Students would look at the test sheet which had pictures of a sun, jet, pin, mop and bat. The teacher pointed to the picture and the student would say the word the picture represented. After all the pictures were identified by the child, the teacher would go back to the picture on top and ask the child to write down the sounds s/he heard in that word on the line to the right of the picture. The student was encouraged to say the word aloud as s/he wrote it. No assistance was given in segmenting.

The three-phoneme spelling task was scored according to Graves' (1983) taxonomy of developmental spelling. Each consonant phonetically represented was worth one point. Interior vowel place holders (lax vowel attempted but incorrect) were given one point while correct vowel represented was worth two points for a 20 point total.

Students who completed the three phoneme word task with a score of 10 or higher next participated in a second task, similar to the first, that assessed their ability to represent both the phonemes of consonant blends in five consonant-vowel-consonant-consonant (CVCC) and consonant-consonant-vowel-consonant (CCVC) words (see appendix F). Words pictured were frog, nest, spin, jump and trap. This task was administered just like the three-phoneme word writing task with children first looking at the pictures, saying all the words and then going back and writing them.

This second phoneme segmentation task demonstrates student ability to isolate individual consonants in blends. Both segmentation tasks provide evidence of students' ability to represent phonemes with corresponding graphemes. The four-phoneme task is also scored with one point given for consonants, one point given for

incorrect interior vowel and two points given for correct interior vowel for a point total of 25. Both graphemic representation of phonemes assessments provide another format for assessing phoneme segmentation and short vowel discrimination. Students might have the ability to isolate and represent short vowel phonemes before it is evident in their invented spellings.

Treatment

The daily sequential phonemic awareness treatment was taken largely from Adams' book, Phonemic Awareness in Young Children, (Adams et al, 1998). The treatment initially followed the schedule outlined in the book for the first four weeks of school (see appendix G). The activities occurred daily for twenty minutes after the students returned from lunch and recess. Children participated as a whole group in a circle on the carpet.

The phonemic awareness training began on the first day of kindergarten. The first activity involved listening to isolated sounds such as hammering, birds singing, babies crying, and motorcycles racing on a tape. At first we would listen to two sounds and children would volunteer to name which sound was first and which was second. Next we listened to three sounds and children attempted to name them in sequence. Daily listening games helped children listen closely and become precise in describing what they heard. Listening activities including whispering words around a class circle and seeing if the word or words accurately made it around. Rhyming books, songs and movement games were also a daily part of the treatment.

As the treatment progressed activities included listening for words in sentences and representing syllables in words with colored tiles. After practicing listening for syllables, the children progressed to representing phonemes in two and three phoneme words by placing a tile in front of them for each phoneme they heard. Volunteers were asked to say the word and point to a tile for each phoneme. Later

children named what letter represented each phoneme.

Other activities included listening for initial and final sounds and placing objects into groups on the basis of initial and final sounds. Children added initial sounds to endings both as an auditory task and later by adding a letter to an ending written on the white board. Students blended phonemes into words when the instructor named objects by speaking in distinct, segmented phonemes. The students' favorite activity at the end of treatment was to have one student look into a paper sack at a mystery object. The student would then name the object, such as a fox, phoneme by phoneme and the class would blend the phonemes and say the word. All children insisted on having their turn and, if they could not auditorily segment the phonemes, the teacher assisted them. Children participated at a variety of levels and student enjoyment of what they called the "word and sound games" was evidenced by all children hurrying to the carpet when they returned from recess and eagerly raising their hands to volunteer for activities.

Variables

The dependent variable, invented spelling ability (ISA), was measured by student performance on a researcher designed writing task. Spellings generated from this task were scored by phonemes represented by word in accordance with Graves (1983) spelling taxonomy. Journal writings were also analyzed and children were assessed as to whether their writings were primarily pre-phonetic, semi-phonetic or phonetic.

The independent variable consisted of an additional 20 minutes of sequential phonemic awareness instruction (which employed the Adams et al. [1998] curriculum) that the treatment group participated in. Both groups received identical instruction in letter names in conjunction with a strong emphasis on letter sounds.

There were several confounding variables in this study. Children yearly enter kindergarten with a great variety of literacy backgrounds and knowledge of the written register. Children receive varying amounts of alphabet reinforcement at home. Children are inundated with letter name stimuli from television shows, videos, alphabet books and tapes making it potentially difficult to assess the effects of focusing on letter sounds. A questionnaire was sent home before school began to inquire about family literacy practices and to inquire whether children displayed interest in reading and writing (see appendix H).

Classroom Environment

The children were all part of a literacy rich environment where they participated in daily writing activities, morning message, shared reading and singing of charts and big books, interactive writing, guided reading and story time. Letter names and sounds were taught simultaneously in a natural format (not letter of the week from A to Z) with high frequency letters coming first and lower frequency letters later. Phoneme awareness instruction for both groups was embedded in meaningful context such as sounding out the names of absentees, sounding out words for word banks, generating spellings for journal entries and listening for and creating rhyme pairs. Children also participated in establishing the labels for environmental print as well as creating a word wall. Journal writing occurred almost daily with the teacher initially helping students sound out words. The teacher would note on these writings what assistance was given.

Data Analysis

T-tests for equality of means were run between groups on capital and lowercase recognition and sound knowledge using both the September pretests and February

posttests. These results were used to demonstrate equality between groups. A t-test on PPVT-R standard scores was also run to check for variance between groups.

The auditory phoneme blending and segmentation tasks were included in a t-test for equality of means. These tasks were of particular interest because they assessed precisely the skills the phonemic awareness treatment had been focusing on. Differences in means were compared to see if there was a significant difference between control and treatment group mean scores.

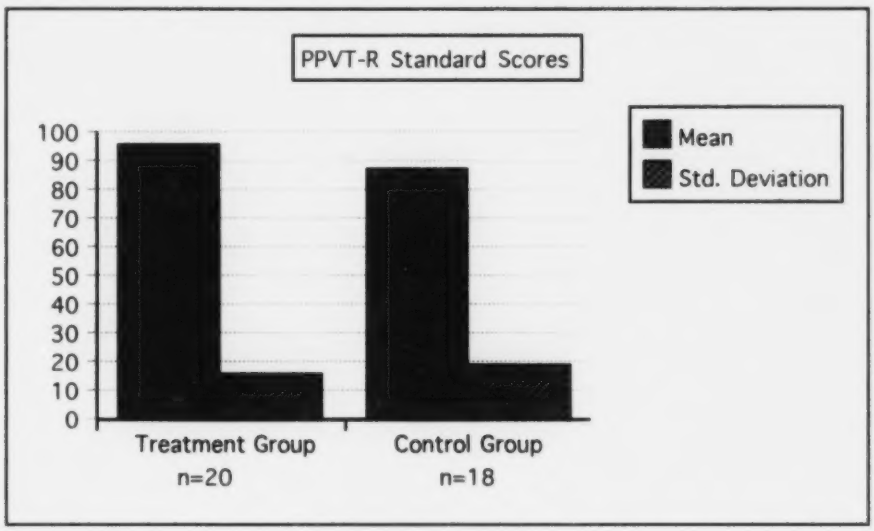
Spellings from the graphemic representation of phonemes tests were scored according to a point system that accorded one point per consonant sound phonetically represented and one point for incorrect interior vowel sound. If the students correctly represented the interior short vowel sound they received two points. A t-test for equality of means was run between groups on both the three letter phoneme representation task and the four letter, consonant blend task. These results were needed to provide evidence of the effect of phoneme segmentation and blending acuity on invented spelling ability.

Journal writings were assessed and rated according to child's demonstrated developmental spelling level from pre-phonetic to phonetic as another measure of invented spelling between groups. Student motivation concerning writing tasks was qualitatively assessed by the instructor in terms of eagerness to write and comments concerning writing.

Results

The PPVT-R standard scores from September were used to demonstrate equality between treatment and control groups. A t-test for equality of means for PPVT-R Standard Scores showed a slightly higher mean performance on the assessment by the treatment group though the variance between groups was neither large nor significant (see Figure 1). Only one ESL child, out of 11 in the study, achieved a basal score on the PPVT-R when it was administered in September. Ten ESL children entered kindergarten with English receptive vocabularies lower than the standard score equivalent of a 2.5 year old English speaking child.

Figure 1. PPVT-R Standard Score group means and standard deviations for treatment and control groups in September.



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Letter Recognition and Symbol-Sound Correspondence

The t-test results for upper and lowercase letter knowledge and letter-sound correspondence for September pretests and February posttest showed no significant differences between the two groups. In September few children in either group demonstrated an understanding of letter-sound correspondence (see Figures 2 & 3).

The control group mean for capital letters was 9.68 with a standard deviation of 8.73. The mean for lowercase letter recognition was 7.53 with a standard deviation of 7.44. Understanding of letter-sound correspondence was low in the control group with a mean of .37 and a standard deviation of 1.38.

The treatment group had a group mean of 9.7 for capital letters with a standard deviation of 9.9. The group mean for lowercase letters was 8.25 with a standard deviation of 8.9. The treatment group mean for letter-sound knowledge was 2.7 with a standard deviation of 6.2. T-tests between showed no significant difference for these pre-assessments.

By February all differences between groups had moderated with the control group having larger mean scores on capitals, lower case and letter-sound correspondence. T-tests for equality of means showed no significant differences between groups on any of these measures. Both control and treatment groups had made considerable gains in alphabet recognition and letter-sound correspondence (see Figures 4 & 5).

Figure 2. Individual scores for alphabet recognition and letter-sound correspondence for control group on September pretest.

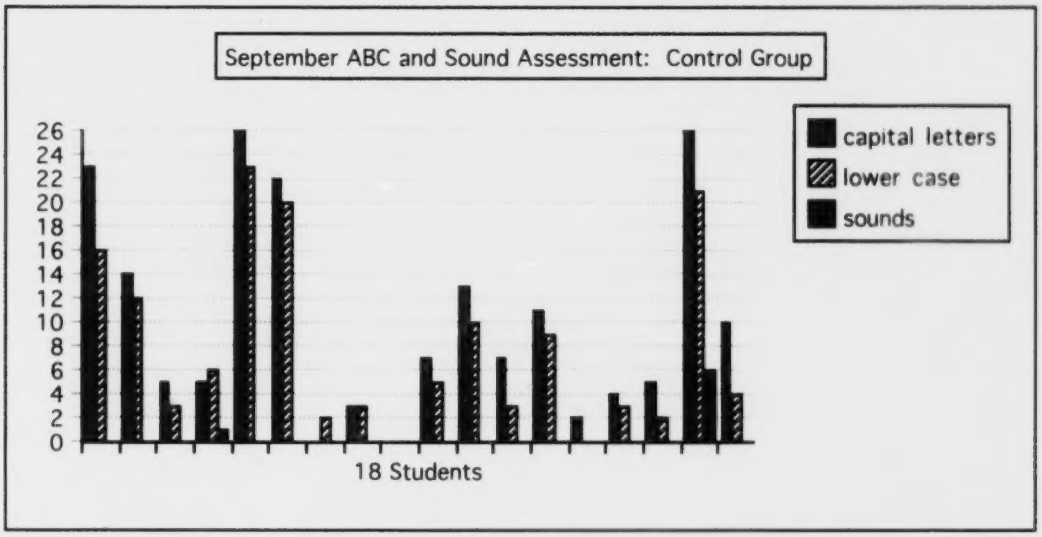

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Figure 3. Individual scores for alphabet recognition and letter-sound correspondence for treatment group on September pretest.

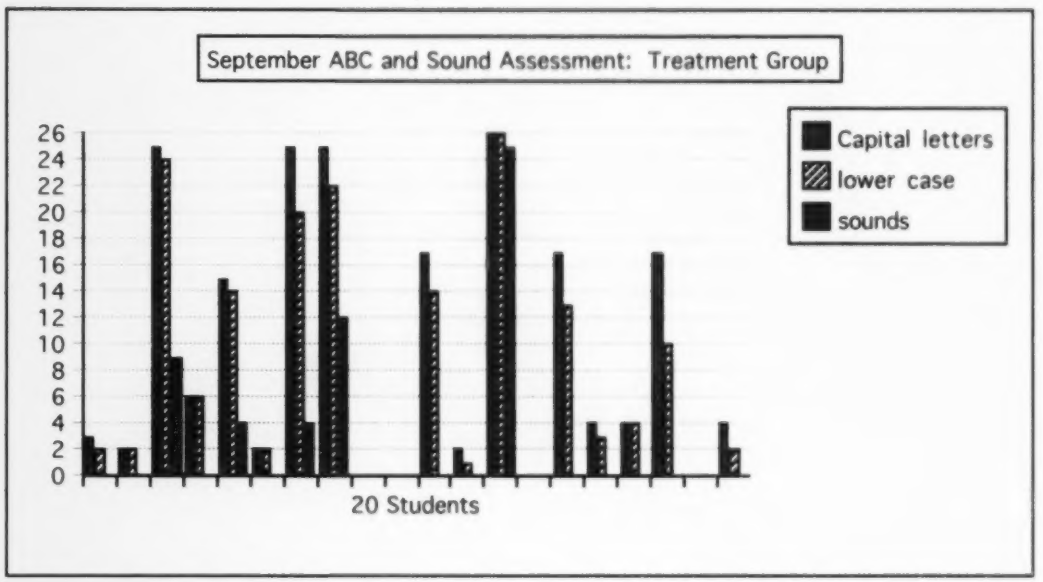


Figure 4. Individual scores for alphabet recognition and letter-sound correspondence for control group on February posttest.

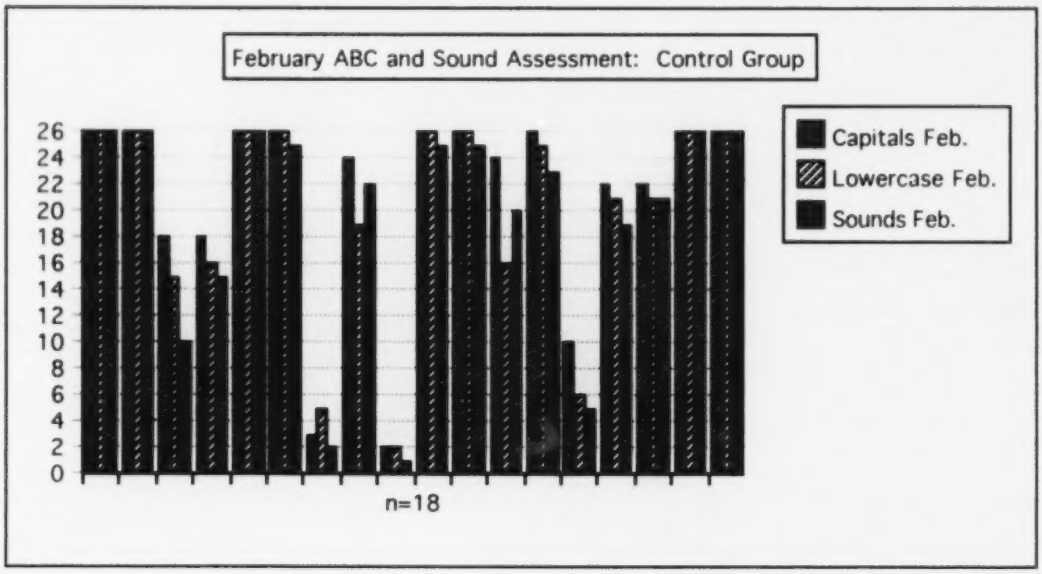
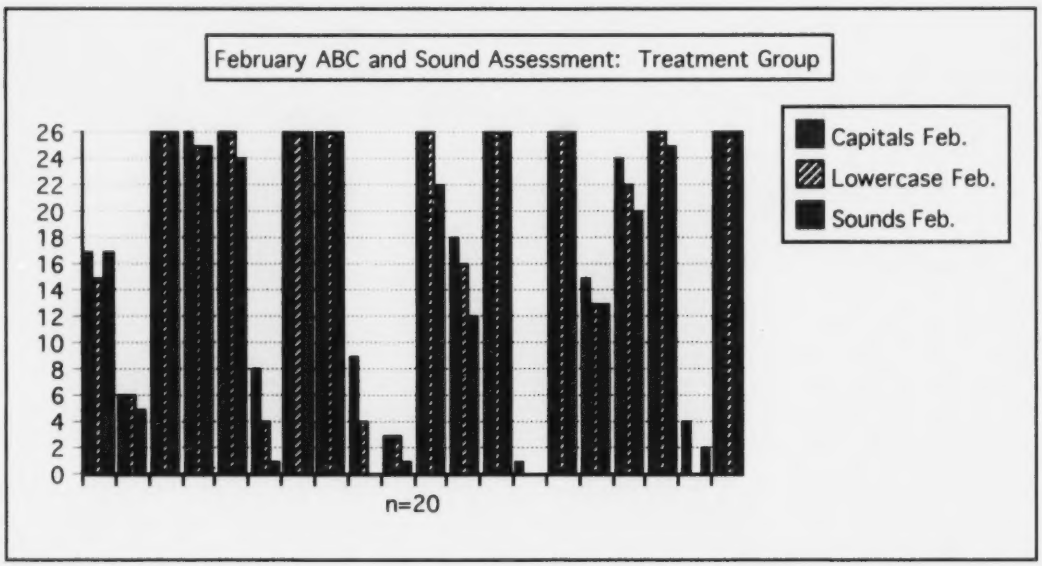


Figure 5. Individual scores for alphabet recognition and letter-sound correspondence for treatment group on February posttest.



Phoneme Blending And Segmentation

Results from t-tests on the phoneme segmentation and blending tasks showed significant differences between groups on both measures ($p<.001$). The treatment group had a mean of 7.95 on the segmentation task compared to a mean of 3.11 for the control group. On the phoneme blending measure, the treatment group had a mean of 7.6 as compared to a mean of 3.47 for the control group.

At the beginning of the year no children in the control group could blend or segment phonemes. In the treatment group three could blend phonemes in three out of ten words on the pretest, receiving a score of three for the blending task. One child had received a score of two. One child in the group scored 10 on the blending task and nine on the segmentation task. He was the only child in both groups who could segment phonemes. Though each group had improved in phoneme segmentation and blending ability, the growth in the treatment group was dramatic.

Students in the treatment group experienced more than twice the growth in phoneme segmentation and blending ability than their peers in the control group. Out of 20 students in the treatment group, 17 could segment phonemes compared to 7 out of 18 in the control group. In terms of phoneme blending, 18 out of 20 children in the treatment group could blend phonemes compared to 10 out of 18 in the control group (see Figures 6 & 7). Even children who spoke little English or were struggling with alphabet recognition in the treatment group successfully segmented and blended phonemes as an auditory task.

Figure 6. Individual scores on 10 point phoneme blending and segmentation tasks for control group in late February.

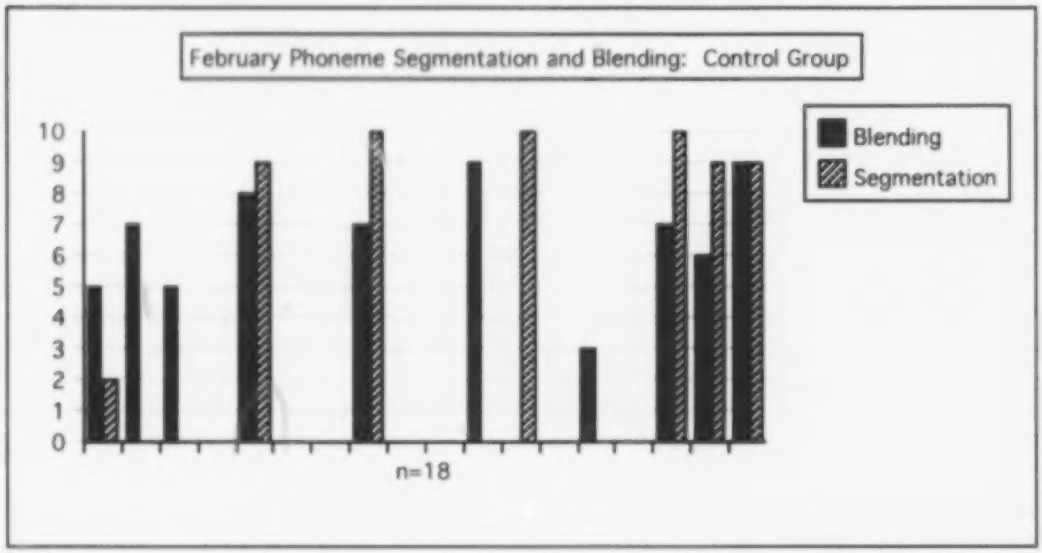
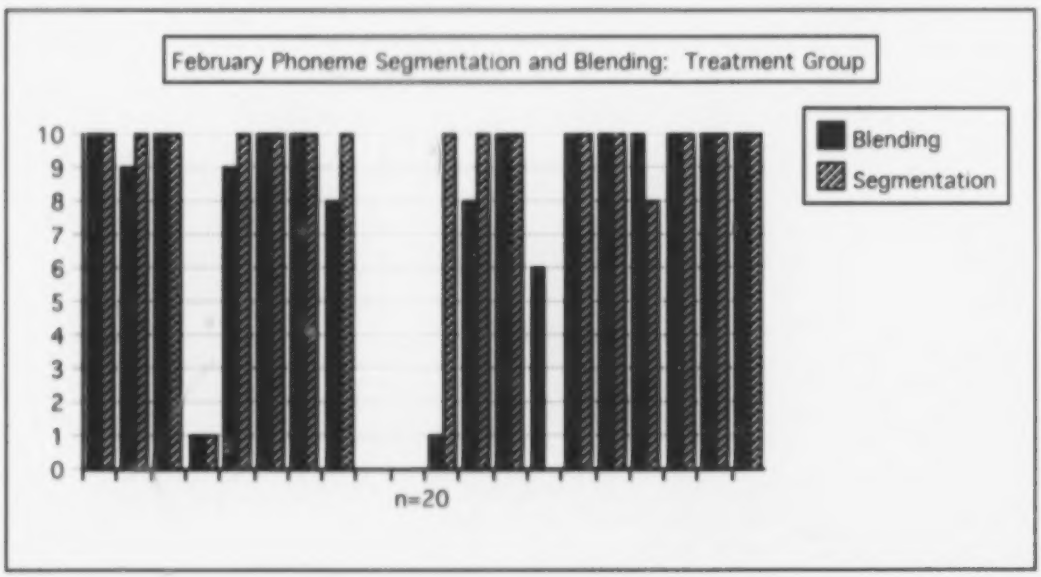


Figure 7. Individual scores on 10 point phoneme blending and segmentation tasks for treatment group in late February.



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Graphemic Representation of Phonemes

The results of the graphemic representation of three-phoneme words assessment also showed a significant difference ($p<.01$) between non ESL students in the control and treatment groups. Three of the five ESL students in the control group began the year with considerably greater alphabet knowledge than the six ESL children in the treatment group. This difference remained constant through February.

The mean score for the 14 non ESL treatment group students on the three letter task was 13.21. The mean score for the 13 non ESL control group students was 9.38. Given no difference in alphabet knowledge between groups, this suggests that training in phoneme segmentation and blending does influence invented spelling ability.

An analysis of the three phoneme spellings showed that ten students in the treatment group were able to isolate short vowel sounds compared to five students in the control group. In the four-phoneme spelling task, five students in the treatment group demonstrated an ability to represent both phonemes in a consonant blend as compared to two students in the control group (see Figures 8 & 9).

Figure 8. Individual scores on 20 point, three-phoneme spelling task for non-ESL students in the control group in late February.

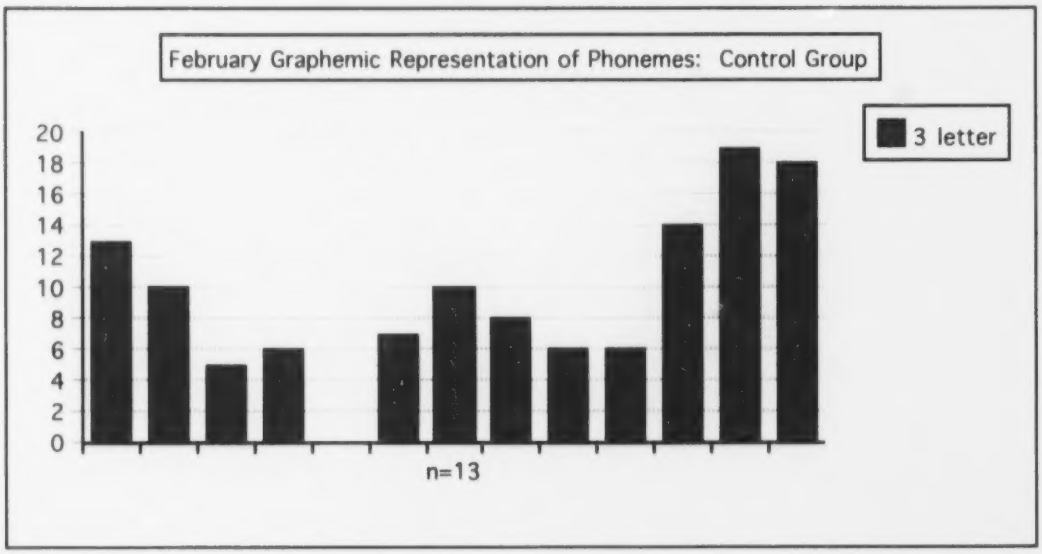
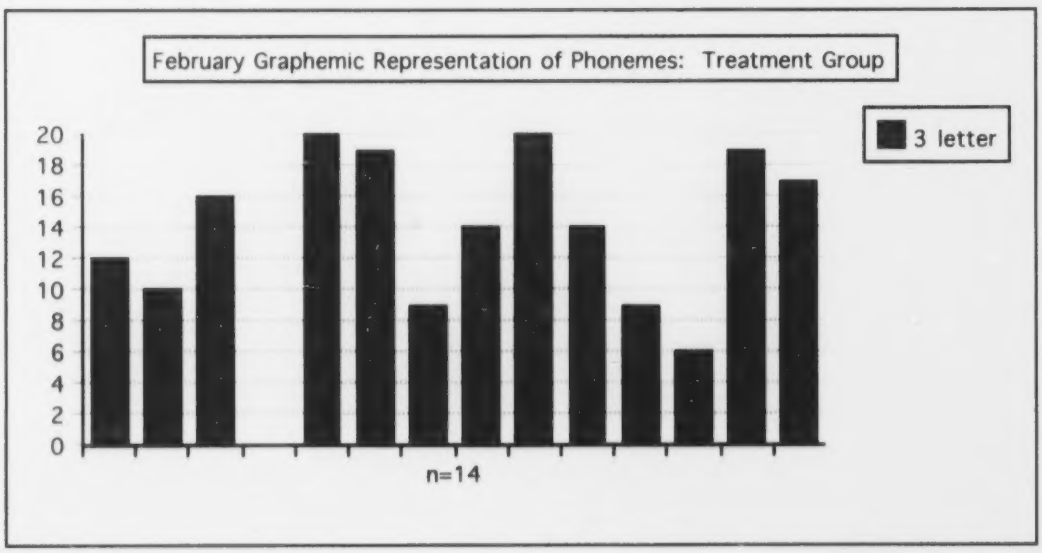


Figure 9. Individual scores on 20 point, three-phoneme spelling task for non-ESL students in the treatment group in late February.

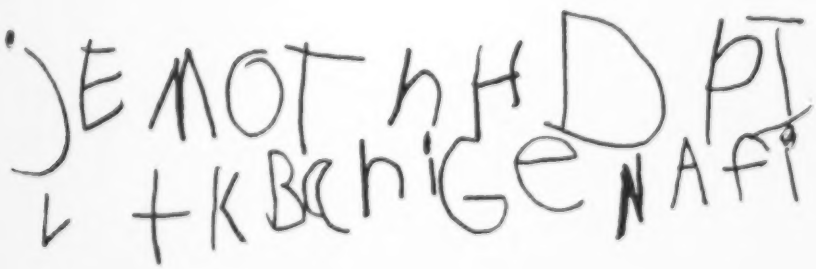


Developmental Spelling Levels

In early September, all 38 kindergartners in the study were writing at a pre-phonetic level. Their writing consisted of letters or letter-like forms that showed no letter-sound correspondence. The children understood that print carries a message and they assigned meaning to their print in accordance with the picture it accompanied.

read: flowers 9/8/99

In an analysis of journal writings conducted in early March, pre-phonetic spellers numbered 6 in the treatment group and 5 in the control group (see Figures 10 & 11). None of the pre-phonetic writers in the control group were able to segment phonemes while three of the pre-phonetic writers in the treatment group were proficient at phoneme segmentation. All children that were writing at the pre-phonetic stage were struggling with grapheme recognition. Of the 6 children at this stage in the treatment group, 4 were ESL. In the control group, 3 of the 5 pre-phonetic writers were ESL. All of these students spoke little to no English at the beginning of the school year.

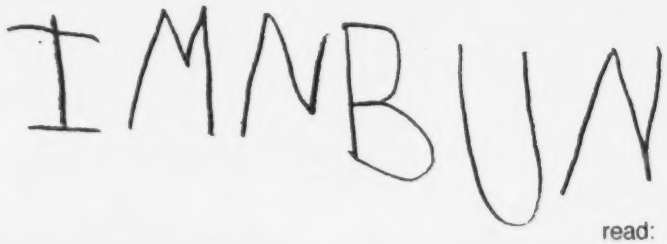


read: It's a pumpkin Barbie. 3/17/00

Though the pre-phonetic writings in February still appear to be random strings of letters, they contained far more letters than the pre-phonetic writings in September. These writings also showed an understanding that print moves from left to write and top to bottom.

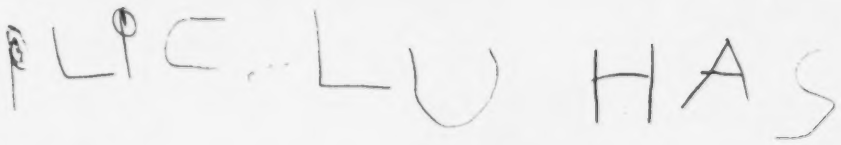
read: The girl is jumping. 1/28/00

The majority of kindergartners in both groups were writing at the semi-phonetic level in March. Semi-phonetic spellings are generally comprised of initial and final sounds and an occasional interior vowel sound. These spellings provide a partial mapping of each word. In the treatment group, 9 children were writing at the semi-phonetic level and 12 children in the control group were also at this stage.



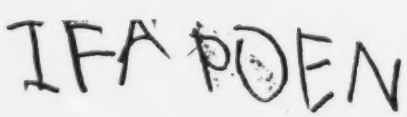
read: I am holding a balloon. 3/24/00

Of the semi-phonetic writers in the treatment group in March, all but one were able to segment phonemes as demonstrated by the auditory phoneme segmentation assessment. Three of the children in the treatment group were still working on letter-sound correspondence. Two of these three were still working with letter recognition.



read: I like the house. 3/31/00

In the control group, six of the nine semi-phonetic spellers had difficulty segmenting phonemes. When these students would say a word aloud, listening for sounds, they would hear either an initial or final sound but were unable to isolate interior sounds. Four of the semi-phonetic spellers were still working on grapheme recognition and letter sound correspondence.



read: I found a pumpkin. 3/27/00

Four children in the treatment group and two children in the control group showed automaticity with sounds, letters and phoneme segmentation and, when guided by the teacher could provide a full phonetic mapping words in their journal writings. Yet, when working independently these students continued to work at the semi-phonetic stage. Thus, they might do well on the three and four-phoneme writing task but, when concentrating on writing a sentence, they were not as precise in their spellings.

read: The rainbow is so beautiful. 3/16/00

The March journal analysis showed that five students in the treatment group and one in the control group were writing at the phonetic level of developmental spelling according to Gentry's five step model (Gentry, 1982). At this level children can phonetically represent each phoneme in the word. All of these students were able to segment phonemes with ease and had automaticity with letter recognition and symbol-sound correspondence. Four of the five phonetic spellers in the treatment group put spaces between their words. The phonetic speller in the control group separated some words while others ran together.

read: My dad is driving on the road. 3/23/00

When the students worked at the phonetic stage, their journal passages became longer and they were able to read back to me what they had written. It was at this stage that I began to see them using their phoneme blending skills in their rereadings of their writings. The five phonetic writers in the treatment group demonstrated a more consistent ability to blend phonemes than the writer in the control group and read their passages with more reliance on reading skill and less on memory.

read: Me and my friend Jasmine are getting our picture taken. 3/31/00

Figure 10. Control group individual developmental spelling levels in February.
1=pre-phonetic 2=semi-phonetic 3=phonetic

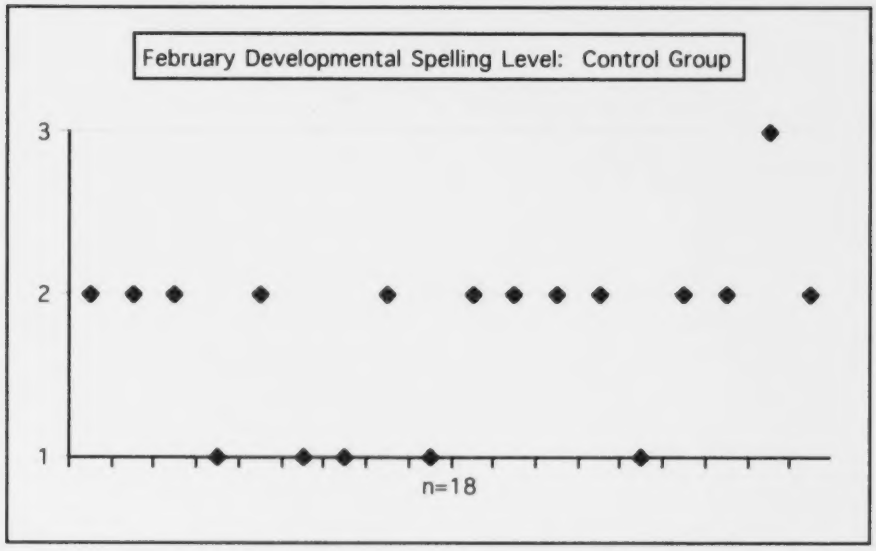
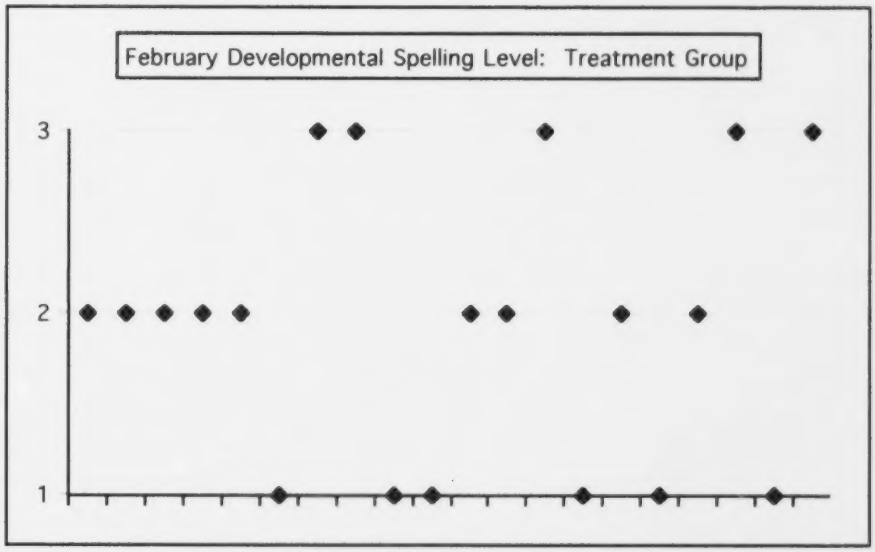


Figure 11. Treatment group individual developmental spelling levels in February.
1=pre-phonetic 2=semi-phonetic 3=phonetic



Conclusion

The results of this study clearly indicate that all children benefit from phoneme blending and segmentation activities and that phoneme segmentation ability increases student ability to represent more phonemes in the words they are attempting to write. When emergent writers try to sound-out words, they say the words aloud and listen for the sounds. Beginning writing has a strong auditory component and when children participate daily in activities which involve segmenting and listening closely to component sounds within words, their ability to fully represent all phonemes in words is increased.

At the onset of this study my driving question concerned whether exposure to daily, sequential phonemic awareness activities, beginning in September, would improve kindergartners' invented spelling ability when measured in February. In the three and four letter phonetic spelling tasks, the treatment group outperformed the control group. An analysis of journal writings in early March showed five students in the treatment group writing at the phonetic stage as compared to one student in the control group. This evidence suggests that training in phonemic awareness does improve kindergartners' invented spelling skill. With alphabet recognition and symbol-sound correspondence measures being equal between groups, all measures of spelling and developmental writing levels favor the children in the treatment group.

Another question addressed whether kindergartners with less emergent writing skill benefit to a greater or lesser degree from phonemic awareness exercises than kindergartners who enter with a stronger literacy background. The one kindergartner in the control group who was writing at the phonetic stage in early March, came into kindergarten with a strong knowledge of graphemes and a beginning understanding of symbol-sound correspondence. Two of the phonetic writers in the treatment group came in with an understanding of graphemes and symbol-sound correspondence

equal to the student in the control group. One phonetic writer from the treatment group came in with a strong knowledge of graphemes but no knowledge of symbol-sound correspondence. The fourth phonetic writer came in recognizing over half the uppercase letters, ten lowercase letters and no sounds. The fifth child recognized four uppercase letters, two lowercase letters and no sounds. The three treatment group phonetic writers who came in with the lowest skills were now three of the most capable writers in March.

This suggests that the less emergent kindergartners made the greatest gains from the treatment. Though the kindergartners who came in with stronger literacy backgrounds showed more immediate progress with phoneme segmentation and blending as evidenced in their writings, the less emergent students had equaled or exceeded their stronger starting counterparts when measured in March.

This leads directly to the next question which asked whether kindergartners trained in phonemic awareness would progress more rapidly through the developmental spelling stages. All other factors being equal, five students from the treatment group as compared to one from the control group were operating at the phonetic level of developmental spelling in their independent writings by early March. In addition, several treatment group students demonstrated an ability to operate at a phonetic level of spelling when presented with a one word task, though they did not consistently write at this level in their journals. This suggests that students trained in phoneme segmentation and blending do have a stronger grasp of the requisite emergent writing skills and might progress more rapidly at least from the pre-phonetic spelling stage to the phonetic.

My next question ponders whether all kindergartners can be trained in phoneme segmentation. In the late February auditory measures of phoneme blending and segmenting, three of the ESL children in the treatment group, while showing very little

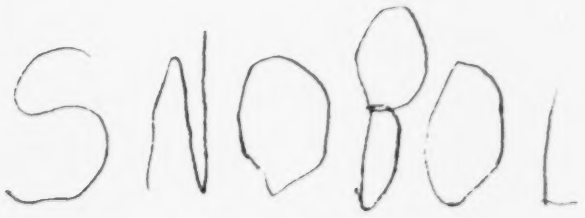
understanding of graphemes or sound-symbol correspondence, showed precise segmentation and blending ability while another child was able to blend but not segment sounds. In the control group only one ESL student (who also recognized 100% of upper and lowercase letters and corresponding sounds) showed proficiency in these auditory tasks. Non ESL children in the treatment group with low alphabet knowledge also performed well in the segmentation and blending tasks as compared to their peers with low alphabet knowledge in the control group. Only one of the kindergartners in the treatment group who had strong graphemic knowledge as well as a thorough understanding of sound-symbol correspondence had difficulty blending and segmenting phonemes in late February. These results suggest that all kindergartners can be trained in phoneme segmentation and blending.

The preceding results also lead to the question of whether children can be phonemically aware without being graphemically aware. I have demonstrated in this research that children can be phonemically aware before they are graphemically aware and I illustrate this point by recounting an event that occurred at the writing center in kindergarten. Travis, who recognizes all letters and corresponding sounds but has difficulty segmenting phonemes, asked for help with a word. Grant, who recognizes only a handful of letters, said immediately, "I'll help you." My initial reaction was to refocus Grant on his own writing but I was intrigued by whether a child with poor grapheme knowledge could help in this situation. Grant listened to the word Travis wanted to spell and segmented it perfectly. Travis was able to represent the phonemes with letters once Grant had segmented them. This struck me as a poignant illustration of how automaticity with letters and sounds combined with phoneme segmentation proficiency are essential in becoming a strong writer in the primary years.

The last question this study addressed inquired whether kindergartners who were

exposed to daily phonemic awareness instruction would show more motivation to take part in invented spelling than children who did not receive this training. I address this question qualitatively by recounting children's responses to their writing taken from the treatment group.

In January the kindergarten took a weather observation walk. When they returned to the classroom they were given observation sheets to fill out with pictures and words. Alec asked me for help with a word but I suggested that he could write it on his own. When I returned to his table I saw that he had represented each phoneme in the six-phoneme word, "snowball." My excitement at his spelling was obvious as was Alec's sense of accomplishment. Alec accelerated in writing after this event. His journal entries became longer and more complex. Two months later when we were talking in a circle about feelings, Alec exclaimed, "I'm very, very happy because I'm such a good writer."



1/12/00

On the September assessment of letter and sounds, Nathan was able to identify four uppercase and two lowercase letters and no sounds. Nathan loved the phoneme segmentation games and began to go around saying words phoneme by phoneme. While he was working in his new journal in March, he came over and asked me how to make the "sh" sound. I asked him what word he was spelling and he said, "Rocket ship." When I saw his journal entry I saw that he had represented six phonemes of

what he considered to be one word and was reading it back to himself so that he could figure out the next. He placed his finger under the "r" and read, "R-o-k-i-t-sh," and successfully heard that the next sound would be, "i." He was not only writing, he was teaching himself to read through his use of invented spelling.

3/24/00

Clearly these children have confidence in their writing skills and are highly motivated writers. Though children in both kindergarten classes show a desire to write and are always willing to work in their journals, in the treatment group children ask to work in their journals without being called to the writing center. Several children work at the writing center during free time on a daily basis. These examples attempt to give evidence for why I believe that children find writing at the appropriate developmental level very motivating in kindergarten.

I initially hypothesized that kindergartners who received additional phonemic awareness instruction would produce longer written passages with more phonemes represented per word than kindergartners who did not receive the treatment. By the end of the study, children trained in phonemic awareness did represent more phonemes per word than children who did not receive this training as evidenced by their scores on the three and four phoneme writing tasks. The length of their independent writings was not affected until they reached the phonetic stage of spelling. I suggest that the increased skill with which the treatment group phonetic spellers were able to segment and blend words added to their confidence in their ability to both encode and decode longer passages. It was in this third stage of developmental spelling that I witnessed students blending phonemes to decode what

they had written so far and proceed from there. The phonetic speller from the control group relied more on memory than on decoding when rereading his writings. If this had been a nine month study, beginning in September and ending in May, the differences between length of passages may have been easier to assess assuming that the number of children in each group operating at the phonetic developmental spelling level would be greater.

Implications

Teachers should provide time each day for writing workshops as well as encouraging children to keep notebooks and to write for a number of authentic reasons. Direct instruction in phonemic awareness appears to enhance young children's invented spelling. Daily, sequential phoneme segmentation and blending activities and games increase students' phonetic acuity as well as increasing their understanding of how sounds create words. This greater understanding is evidenced in the invented spellings of kindergartners trained in phonemic awareness. The invented spellings of emergent writers provide insight into the understandings children have of orthography. Teachers can analyze these writings and assess what the next natural step in writing is for each child.

Invented spelling is a powerful tool for enabling children to construct their own knowledge of the reading process. Chomsky (1971) stated, "Children ought to learn how to read by creating their own spellings for familiar words as a beginning" (p. 296). If we encourage children to use their knowledge of sound-symbol correspondence and phoneme segmentation, we permit them to actively participate in teaching themselves to read.

Several years of research studies provide evidence that invented spelling should be recognized as a natural, sequential part of spelling development. Encouraging

children to play and create using their knowledge of sound-symbol correspondence strengthens both their encoding and decoding skills in relation to reading. As educators of young children, we need to facilitate the development of invented spelling ability.

Further research needs to be conducted to determine at what point in a child's spelling development teachers should begin to emphasize conventional spellings. Efficacy of teacher scaffolding between developmental stages in spelling also needs to be assessed to determine how educators can best assist students' writing development.

ME AND CRSN
LOGEN AND A BUNE
N FRUT U US.

read: Me and Carsen logging and a bunny in front of us. 1/21/00

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Appendices

Appendix A - Parent Release Letter

Appendix B - Alphabet Assessment

Appendix C - Phoneme Blending Task

Appendix D - Phoneme Segmentation Task

Appendix E - Three Phoneme Spelling Assessment

Appendix F - Four Phoneme Spelling Assessment

Appendix G - Daily Phonemic Awareness Schedule

Appendix H - Questionnaire

Appendix I - Assessment of Developmental Spelling

Dear Kindergarten Parents,

I am very excited to be beginning a new school year in our brand new building. It's hard to believe we've made the move and are all ready to go! I look forward to meeting you all at kindergarten orientation.

I am completing my Master's Degree in Elementary Education at Western Washington University this year. The course work focuses on literacy and what we can do to promote reading and writing in our classrooms. As part of my study, I will be collecting writing samples from my kindergartners that show their spelling development throughout the year. I will be writing about the stages of developmental spelling young children go through as they are learning the alphabet and the sounds that go with letters.

To use student work as part of a Master's project, Western requires that its graduate students obtain written permission from parents. I will not be focusing on individual students but will be looking at student growth throughout the year. All student results will be confidential and completely private. If you have any questions or concerns, I would be happy to discuss them with you.

Please sign and return the lower portion of this form on kindergarten orientation day. I am very excited to meet the wonderful kindergarten class of the year 2000!

Sincerely, AnnMarie Henterly

****

I allow my child's kindergarten writing samples to be included in AnnMarie Henterly's study of developmental stages of spelling.

Signed_____Date_____

Uppercase Letter Recognition

Highlight the letters that the student names.
Fall = Orange _____
Winter = Blue _____
Spring = Pink _____

Name _____

A	N	B	O	C
P	D	Q	E	R
F	S	G	T	H
U	I	V	J	W
K	X	L	Y	M
Z				

Mt. Baker School District, 1999

Lowercase Letter Recognition

Highlight the letters that the student names.
Fall = Orange _____
Winter = Blue _____
Spring = Pink _____

Name _____

a	n	b	o	c
p	d	q	e	r
f	s	g	t	h
u	i	v	j	w
k	x	l	y	m
z				

Phoneme Blending

Directions: Tell the student the following:

"I am going to say some sounds. If you put the sounds together, they make a word."
Give an example, such as "/m/ (pause) /a/ (pause) /n/. What word is that?"
Give other examples as needed, such as /n/--/o/--/t/ (not); /c/--/a/--/t/ (cat).
Write the child's response.

Scoring: Student receives one point for each correctly blended word.

		Sept.	Nov.	Mar.	June
1.	/m/--/o/--/p/				
2.	/m/--/a/--/n/				
3.	/f/--/oo/--/d/				
4.	/m/--/a/--/d/				
5.	/g/--/e/--/t/				
6.	/b/--/i/--/g/				
7.	/f/--/a/--/l/				
8.	/d/--/a/--/d/				
9.	/t/--/e/--/n/				
10.	/d/--/o/--/g/				
	Total	/10	/10	/10	/10

Adapted from "Teaching in the Early Years" handout, Mark Jewell, 1998

Phoneme Segmenting

Directions: Tell the student the following:
"I will say a word, and you tell me the sounds that you hear in the word."
Give an example, such as Mike (M-ike); shop (sh-op); cat (c-at).
Write the child's response.

Scoring: Student receives one point for each correctly segmented word.

		Sept.	Nov.	Mar.	June
1.	soap				
2.	more				
3.	food				
4.	mad				
5.	get				
6.	big				
7	fall				
8.	dad				
9.	ten				
10.	dog				
	Total	/10	/10	/10	/10

Adapted from "Teaching in the Early Years" handout, Mark Jewell, 1998

Phoneme Segmentation Assessment

Ask child to name the picture. After they've said it aloud, have them write the word on the blank. There are four points possible for each word. One point is given for correct initial consonant sound. One point is given for correct final consonant sound. One point is given for interior vowel place holder. Two points are given if they have the correct interior vowel. There are 20 points possible for this assessment.

points

_____ ___

_____ ___

_____ ___

_____ ___

_____ ___

total points ___

date _____

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Consonant Blend Phoneme Segmentation Assessment

This assessment is given after child demonstrates success in the initial, five word phoneme segmentation assessment. This assessment diagnoses their ability to segment two consonant sounds in a blend. There are five points possible for each word. One point is given for correct initial consonant sound. One point is given for correct final consonant sound. Another point is given if they have both letters of the consonant blend. One point is given for interior vowel place holder. Two points are given if they have the correct interior vowel. There are 25 points possible for this assessment.

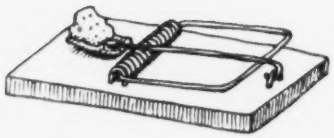
points

_____ ___

_____ ___

_____ ___

_____ ___



_____ ___

total points ___

date _____

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Black Line Master: Kindergarten

Developmental Spelling and Phonemic Awareness

Dates: Sept. 3, Sept. 7, Sept. 8, Sept. 10, Sept. 14, Sept. 17, Sept. 21, Sept. 22, Sept. 24, Sept. 28, Oct. 5, Oct. 6, Oct. 12, Oct. 15, Oct. 19, Oct. 20, Oct. 22, Oct. 26, Oct. 29, Nov. 2, Nov. 3, Nov. 5, Nov. 9, Nov. 16, Nov. 17, Nov. 19, Nov. 23, Nov. 30, Dec. 1, Dec. 3, Dec. 7, Dec. 10, Dec. 14, Dec. 17, Jan. 4, Jan. 7, Jan. 11, Jan. 12, Jan. 14, Jan. 18, Jan. 25, Feb. 4, Feb. 29

Listening Games

- 3A Listening to Sounds
- 3B Listening to Sequences of Sounds
- 3C Jacob, Where Are You?
- 3D Hiding the Alarm Clock
- 3E Who Says What?
- 3F Whisper Your Name
- 3G Nonsense
- 3H Whispering Game
- 3I Do You Remember?

Rhyming

- 4A Poetry, Songs, and Jingles
- 4B Rhyme Stories
- 4C Emphasizing Rhyme Through Movement
- 4D Word Rhyming
- 4E Can You Rhyme?
- 4F The Ship Is Loaded with...
- 4G Action Rhymes
- 4H Rhyme Book

Words and Sentences

- 5A Introducing the Idea of Sentences
- 5B Introducing the Idea of a Word
- 5C Hearing Words in Sentences
- 5D Exercises with Short and Long Words
- 5E Words in Context and Out

Awareness of Syllables

- 6A Clapping Names
- 6B Take One Thing from the Box
- 6C The King's/Queen's Successor
- 6D Listening First, Looking After
- 6E Troll Talk I: Syllables

Daily Phonemic Awareness Schedule

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	Nov. 9	Nov. 19	Nov. 23	Nov. 30	Dec. 1	Dec. 3	Dec. 7	Dec. 10	Dec. 14	Dec. 15	Dec. 17	Jan. 4	Jan. 7	Jan. 11	Jan. 12	Jan. 14	Jan. 18	Jan. 21	Jan. 25	Jan. 28	Feb. 1	Feb. 2	Feb. 4	Feb. 8	Feb. 11	Feb. 15	Feb. 16	Feb. 25	Feb. 29
Initial and Final Sounds																													
7A Guess Who	7A																										7A	7A	
7B Different Words, Same Initial Phoneme																													
7C Finding Things, Initial Phonemes			7C		7C						7C	7C	7C		7C		7C												
7D I'm Thinking of Something		7D		7D		7D				7D																			
7E Word Pairs I: Take a Sound Away (Analysis)							7E																						
7F Word Pairs II: Add a Sound (Synthesis)																													
7G Different Words, Same Final Phoneme									7G		7G																		
7H Finding Things: Final Phonemes								7H				7H	7H			7H	7H												
7I Spider's Web																													
Phonemes																													
8A Two-Sound Words																8A	8A		8A										
8B Basic Three-Sound Words																			8B	8B	8B	8B	8B						
8C Consonant Blends: Adding and Subtracting Initial Sounds																													
8D Consonant Blends: Inserting and Removing Internal Sounds																													
8E Building Four-Sound Words																					8F	8F	8F	8F	8F	8F			
8F Guess a Word																									8F				
8G Troll Talk II: Phonemes																				8G	8G			8G					
Introducing Letters and Spellings																													
9A Guess Who: Introducing Sounds and Letters																		9A											
9B Picture Names: Initial Sounds and Letters																													
9C I'm Thinking of Something: Initial Sounds and Letters																	9C												
9D Picture Names: Final Sounds and Letters																											9D		
9E Picture Search: Initial or Final Consonants																													
9F Introduction to How Words Are Spelled: Add a Letter										9F					9F						9F	9F	9F	9F	9F	9F	9F	9F	9F
9G Swap a Letter																													
9H Sounding Words																													

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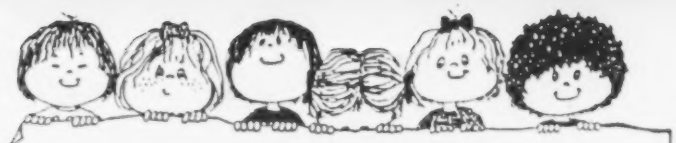

Kindergarten Questionnaire

In order to provide the very best beginning to a great school year, please take a few minutes to complete the following questions.

Child's Name: _____ Birth Date: _____

What name does your child prefer to be called? _____

Parents'/Guardians' Names: _____

_____

Occupation: (Father's) _____

(Mother's) _____

Does your child live with? (Circle all that apply) mother father stepparent guardian

List the names and ages of brothers or sisters.

Will a brother or sister be attending Kendall Elementary this year?
If so, list names and grades.

Did your child attend Preschool?_____ If so, where? _____

Does your child enjoy being read to? _____

What books does your child enjoy? _____

_____

_____

Does your child show an interest in writing or working with letters?_____

What are your child's favorite activities?

What are your goals for your child this school year?

Assessment of Developmental Spelling

Prephonetic **Writing sample**

* Child understands that print carries a message.

* Child uses letters and symbols to represent written language.

* Writing resembles random strings of letters with no sound/symbol correspondence.

* Child assigns message to their writing.

* Child demonstrates a beginning understanding of directionality.

  * Left to right.
  * Top to bottom.

* Child includes numerals as part of word spelling.

* Child enjoys experimenting and exploring with writing.

Teaching Emphases

1) Provide many opportunities for child to develop knowledge of sound/symbol correspondence.

2) Keep current assessment of known and unknown letters for each child.

3) Involve child in numerous phonemic awareness activities.

4) Model writing throughout the day.

5) Immerse child in a print rich environment.

Comments

Letter formation:

Use of capital letters:

Use of lower-case letters:

date_____

Assessment of Developmental Spelling

Semi-Phonetic

* Child demonstrates an understanding of sound-symbol correspondence.

* Invented spellings provide a partial mapping of each word. (1-3 letters can represent an entire word.)

    * Initial consonant represented.
    * Final consonant represented.
    * Vowel place-holder represented.

* Child understands that print moves from left to right.

* Child understands that print moves from top to bottom of page.

* Child uses letter name strategy to represent more than one phoneme (eg., letter R is used for word ARE).

* Child begins to leave spaces between words.

* Child uses a small bank of sight words correctly.

Teaching Emphases

1) Continue to work on segmenting words into individual phonemes.

2) Develop individual dictionaries of high-frequency and high-interest words.

3) Provide authentic group and individual writing activities throughout the day (eg., letters to friends, stories, journal entries, etc.)

4) Provide opportunities for children to explore sound-symbol relationships in group writing and reading activities.

Writing Sample

Comments

Letter formation:

Use of capital letters:

Use of lower-case letters:

date_____

Assessment of Developmental Spelling

Phonetic

* Spelling represents a total mapping of letter-sound correspondence within the word.

* Child chooses letters strictly on the basis of sound, not conventions.

* Child leaves spaces between words.

* Child formulates own systematic rules for spellings, eg. becuz (because), haos (house), hape (happy), etc.

* Child begins to read own writings with one-to-one word correspondence.

* Child's writings are decodable by others.

* Child begins to spell some high-frequency words correctly, eg. the, and, is, see, am, etc.

* Child sometimes omits one letter from a consonant blend or digraph.

* Letter-name spelling strategy may still be in evidence.

Teaching Emphases

1) Help children look for visual patterns and common letter sequences in words.

2) Continue to develop word banks incorporating thematic, high frequency and high interest words.

3) Introduce some conventions such as word families, spelling patterns and word structure. Write daily!

4) Have child proof-read and edit their work in the, "Tell Me More," format.

Writing Sample

Comments

Letter formation:

Use of capital letters:

Use of lower-case letters:

date_____